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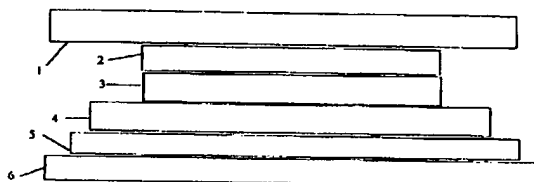
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US 4996104 A US 4459046 A

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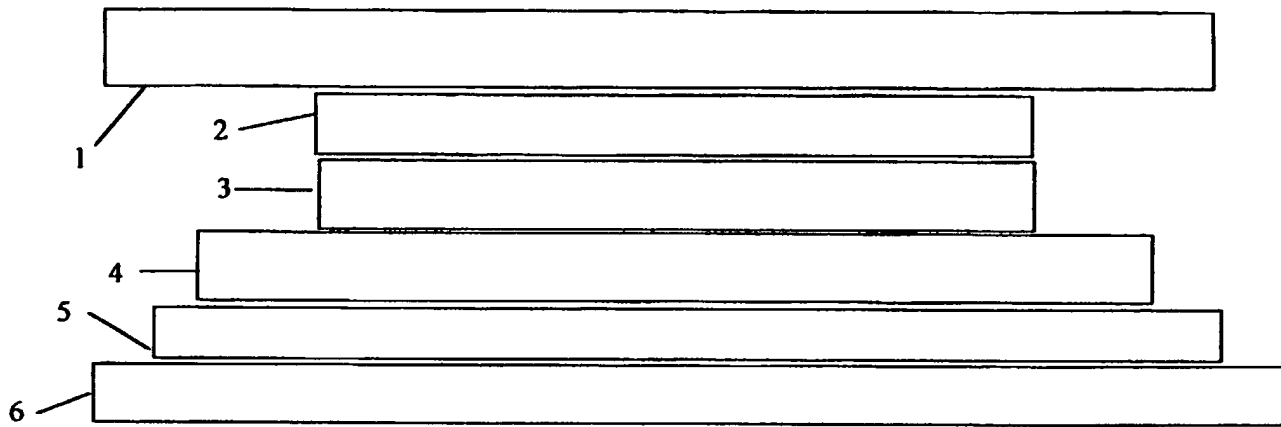
(54) Abstract Title: **Condition sensitive label**

(57) A label that has means to changes its appearance based on changing physical conditions, eg temperature, can change part of its colour to render information printed upon it unreadable. A transparent layer 1 with information printed preferable on the under side is mounted over a medium 2 which is in turn mounted on a substrate 3. At a predetermined temperature, the medium 2 changes from a solid to a liquid state, and is absorbed by the substrate. By matching the colour of the printed information on the transparent layer 1 to the colour of the substrate, said printed information can be masked. A layer of adhesive 5 with release paper 6 can be mounted on the other side of the substrate, preferably interposed by a layer of plastics foil 4. The printed information may be in the form of a bar code. The condition detected may instead be humidity.



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Sensitive Label

The present invention relates to sensitive labels.

There are a number of currently available temperature sensitive labels, typically used on the packaging of perishable items such as foods. Examples are disclosed in Swiss patent No. 642452 and US patents 4459046, 4354105 and 4996104. Labels of the kind disclosed in US patent 4459046 use a white temperature responsive compound applied to a black blotting paper. The white compound has a selected melting temperature. When the white compound melts it is absorbed into the black blotting paper such that the hole appears black.

US 4996104 discloses a temperature-sensitive material which may be printed on a label as a bar code. The material includes a large number of fracturable microcapsules containing a medium which changes from a solid state to a liquid state at a predetermined temperature.

The present invention provides a label comprising a first layer which responds to a physical influence by changing from a first condition to a second condition and a second layer bearing readable information in the form of a pattern overlying the first layer, the second layer being stable under said physical influence, wherein the nature of the change is such as to render at least a part of the second layer unreadable.

Thus the invention provides a label that can be applied to articles for the purpose of determining whether the articles have been exposed to some kind of physical influence.

The pattern could be an optically readable pattern such as a bar code, which is read by an optical device. The reading device may use visible or invisible (e.g. infrared) radiation. Alternatively other patterns are possible, readable by for example by radio frequency beams, or magnetic fields.

The purpose of the first or background layer is to provide the necessary contrast to enable the pattern to be read under normal conditions. When the label has been subject to abnormal conditions such as high temperature the background layer ceases to serve this purpose.

Another example of a physical influence, which might be detected by a label according to the invention, is raised humidity.

In the preferred embodiment of the invention, the first layer comprises a layer of a medium in solid form, which becomes fluid at the predetermined temperature, carried by a substrate layer. Preferably, the material of the substrate layer absorbs the medium in its fluid form. The medium preferably exhibits a first colour and the substrate preferably exhibits a second colour. The properties of the medium and the substrate are preferably such that the colour of the medium is masked by the substrate upon absorption of the medium by the substrate.

Preferably this substrate is applied to an adhesive foil so as to enable the label to be adhered to product packaging. Preferably a plastic foil is interposed between the substrate and the adhesive foil. Usually, the adhesive foil will be applied to a release layer.

An embodiment of the invention will now be described by way of example only and with reference to the accompanying drawing which is a schematic diagram illustrating the layers of material used in a preferred label according to the invention.

Referring to the drawing, the uppermost layer 1 comprises a flexible transparent foil on which a bar code is printed, possibly on top but preferably underneath for protection of the ink or other print medium.

Underneath the foil 1 is a layer of the aforementioned melting medium applied in solid form to a capillary active substrate 3. The capillary active substrate 3 overlies an optional layer of plastic foil 4 to the back of which is applied an adhesive 5, possibly also in the form of a foil, and release paper 6. It will be appreciated that the layers 2 and 3 form the background layer referred to above. The capillary active substrate may be an absorbent material such as blotting paper impregnated with dye of the aforementioned second colour. Alternatively, it may be an absorbent material coated with a porous layer of material of said second colour. The melting compound 2 preferably has a narrow temperature zone for its solid/liquid phase transition. The colour of this material should have a high contrast towards the colour of the capillary active substrate 3. For example, the compound 2 could be white and the capillary active substrate 3 could be black.

A known material used in temperature sensitive labels may be used for the melting medium 2 which melts at 54°C. At this point, the fluid material is absorbed by capillary forces into the underlying capillary active substrate 3 thus exposing the black colour of the substrate 3 as a background to the top layer 1.

Whilst the melting compound 2 is in its solid form, it forms a white background to the black printed bar code on the transparent layer 1 so that the bar code can be properly scanned by suitable machinery. When the melting compound becomes liquid and is absorbed by the capillary active substrate, the background to the bar code is black and hence it is unreadable.

It should be noted that the thicknesses of the layers are not proportional in the figure and in fact the transparent flexible top layer 1 could be in direct contact with the adhesive foil 5. Thus the complete "sandwich" of layers 2, 3 and 4 would be sealed between layers 1 and 5.

In one optional embodiment of the invention, the printed bar code on the layer 1 partially overlaps the layers 2 and 3. Thus a part of the bar code can be read but another part is illegible indicating that the product to which the label has been applied has been taken to a temperature above the melting temperature of the material of layer 2. For example, it might be arranged that the identification data for the product is still legible once the layer 2 has melted but other data is illegible thereby indicating that the product to which the label is applied has exceeded the melting temperature of the layer 2.

Labels according to the invention will have numerous applications for all kinds of perishable products such as foods, medicines, chemicals etc. It will be appreciated that the material of the layer 2 would be selected according to the product to which the label would be applied.

Claims:

1. A label comprising a first layer which responds to a physical influence by changing from a first condition to a second condition and a second layer bearing readable information in the form of a pattern overlying the first layer, the second layer being stable under said physical influence, wherein the nature of the change is such as to render at least a part of the second layer unreadable.
2. A label as claimed in claim 1 in which the first layer comprises a layer of a medium in solid form which becomes fluid under said physical influence, carried by a substrate layer.
3. A label as claimed in claim 2 in which the material of the substrate layer absorbs the medium in its fluid form.
4. A label as claimed in claim 3 in which the properties of the medium and the substrate are such that the colour of the medium is masked by the substrate upon absorption of the medium by the substrate.
5. A label as claimed in any preceding claim in which the first layer is applied to an adhesive foil.
6. A label as claimed in claim 5 in which a plastic foil is interposed between the first layer and the adhesive foil.
7. A label as claimed in claim 5 or 6 in which the adhesive foil is applied to a release layer.
8. A label as claimed in any preceding claim in which the pattern is a bar code.

9. A label as claimed in any preceding claim in which the physical influence is a change in temperature.
10. A label as claimed in any preceding claim in which the change in condition involves a change in temperature.



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Claims searched: 1-10

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Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): B8F (FBG, FBX)

Int Cl (Ed.7): G09F 3/02

Other: Online: Epodoc, WPI, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	US 4996104 (NICHOLAS) Column 2 lines 1-24	1,2,5,7,8-10
Y	US 4459046 (SPIRG) Column 2 lines 5-25, figure 2	1,2,5,7,8-10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application